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FORM PTO-1390

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: CIBL 10858 US

U.S. APPLN. NO. (If known, see 37 CFR 1.5) 09/601477

INTERNATIONAL APPLICATION NO.:	INTERNATIONAL FILING DATE:	PRIORITY DATE CLAIMED:
PCT/GB99/00194	20 January 1999	04 February 1998

TITLE OF INVENTION: BATTERY

APPLICANT(S) FOR DO/EO/US: Kenneth Michael PARTINGTON and David Colin SMITH

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [X] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [X] has been transmitted by the International Bureau. (see attached copy of PCT/IB/308)
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Item 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A **FIRST** preliminary amendment.
    [ ] A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information: International Preliminary Examination Report (PCT/IPEA/409) and annexes
    International Search Report (PCT/ISA/210)
    Form PCT/IB/308
    Patent Data Entry Sheet

U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 09/601477	INTERNATIONAL APPLICATION NO. PCT/GB99/00194	ATTORNEY'S DOCKET NO. CIBL 10858 US

	CALCULATIONS PTO USE ONLY
17. [X] The following fees are submitted:	
BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):	
Neither international preliminary examination fee (37 CFR1.482) nor international search fee (37 CFR1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... $ 970.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... $ 840.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... $ 690.00	
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... $ 670.00	
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... $ 96.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 840.00
Surcharge of $130.00 for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 130.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	$
Total claims	15 - 20 =	0	X $18.00	$
Independent claims	1 - 3 =	0	X $78.00	$
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ $260.00	$

TOTAL OF ABOVE CALCULATIONS =	$ 970.00
Reduction of ½ for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28). +	$
SUBTOTAL =	$ 970.00
Processing fee of $130 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR1.49(f)).	$
TOTAL NATIONAL FEE =	$ 970.00
Fee for recording the enclosed assignment (37 CFR1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +	$
TOTAL FEES ENCLOSED =	$ 970.00
Amount to be refunded:	
charged:	

a. [X] A check in the amount of $ **970.00** to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. **25-0120** in the amount of $ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required by 37 CFR 1.16 and 1.17, or credit any overpayment to Deposit Account No. **25-0120**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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August 3, 2000

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PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Kenneth Michael PARTINGTON et al.

Serial No. (unknown)

Filed herewith

BATTERY

PRELIMINARY AMENDMENT

Commissioner for Patents

Washington, D.C. 20231

Sir:

Prior to the first Official Action and calculation of the filing fee, please replace specification pages 1-4, two sheets of drawings containing Figures 1 and 2, and Claims 1-13 as originally filed, which appear on pages 5 and 6, with the specification, drawings and Claims 1-15 filed in the Article 34 amendment of 04 February 2000. The replacement pages are marked "AMENDED SHEET" and are attached hereto. Following the insertion of the replacement pages, please amend the claims as follows:

IN THE CLAIMS:

Claim 3, line 1, cancel "or Claim 2".

Claim 4, line 1, change "any one of the preceding claims" to --claim 1--.

Claim 5, line 1, change "any one of preceding claims" to --claim 1--.

Claim 8, line 1, change "any one of the preceding claims" to --claim 1--.

Claim 11, line 1, cancel "or 10".

Claim 15, line 1, change "any one of Claims 9 to 12" to --claim 9--.

R E M A R K S

The above changes in the specification, drawings and claims merely place this national phase application in the same condition as it was during Chapter II of the international phase, with the multiple dependencies being removed. Following entry of this amendment by substitution of the pages, only amended claims 1-15 remain pending in this application.

Respectfully submitted,

YOUNG & THOMPSON

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August 3, 2000

BATTERY

This invention relates to a battery (also known as an accumulator), particularly but not exclusively of the lead acid type.

One known lead acid battery comprises a plurality of rectangular plates arranged parallel to one another and separated by insulating separating sheets. Alternate plates are positive and negative electrodes respectively, all the positive electrodes being connected together electrically by a first connector and all the negative electrodes being connected together electrically by a second connector, the two connectors being connected to positive and negative terminals respectively.

If the plates, all rectangular, are relatively long and narrow, and the connector and/or terminal is connected to a narrow edge, then there is a relatively long conducting path for the current from the area of the plate adjacent the opposite narrow edge to the connector or terminal. Since the conductivity of lead is significantly less than that of a metal such as copper or aluminium, there is a limit to the current carrying capacity of each electrode, since increasing the current increases the heat generated within the plates. Thus, particularly where other factors dictate that a battery has electrodes which are long and narrow, and the terminals or connectors are attached to a narrow edge of the electrodes, and further if the battery is located in a confined space, the limit on the current carrying capacity is a considerable disadvantage.

EP-A-044259 discloses a battery having a plurality of alternating positive and negative plates; at least one tab protruding from one edge of each of the positive and negative plates; at least one tab protruding from an opposite edge of each of the positive and negative plates; a pair of negative plate straps connecting together each tab protruding from each negative plate; a pair of positive plate straps connecting together each tab protruding from each positive plate; a first diagonal bar connecting together the pair of negative plate straps; and a second diagonal bar connecting together the pair of positive plate straps.

It is an object of the present invention to provide a battery having an improved current carrying capacity.

In accordance with the invention a battery comprises a housing containing a plurality of positive plates connected in parallel and a plurality of negative plates connected in parallel, the positive plates each being of substantially the same size and rectangular shape having two long edges and a first short edge and a second short edge, and the housing also containing a member having a first end and a second end, the first end being electrically connected to the first short edges of the positive plates adjacent one of the two sets of long edges and the second end being electrically connected to the second short edges of the positive plates adjacent the same set of long edges or to the same set of long edges of the positive plates immediately adjacent to the second short edges, the member extending parallel to the said long edges for most of its length and consisting of a material which has a greater conductivity than the material of the positive plates.

The negative plates may each be substantially the same size and rectangular shape having two long edges and a first short edge and a second short edge, and a further member may be provided, the further member having a first end and a second end, the first end being electrically connected to the first short edges of the negative plates and the second end being electrically connected to the second short edges of the negative plates or to one of the long edges of the negative plates immediately adjacent to the second short edges, the further member consisting of a material which has a greater conductivity than the material of the negative plates.

The negative plates and the positive plates may all be substantially the same size and rectangular shape.

The first short edges of the positive plates may be connected by a first connector which is electrically connected to a positive terminal of the battery.

The second short edges of the positive plates may be connected by a further connector which is either of the same general material as the positive plates, e.g. in the case of a lead acid battery the material is lead, or, alternatively, of the same general material as the member.

If the battery is a lead acid battery, the member preferably comprises copper, or a copper alloy such as brass, or aluminium or an alloy thereof,

covered in a lead sheath. The sheath may be covered in an acid resistant material such as an epoxy resin.

Two embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, of which

Figure 1 shows a perspective view of the interior of a lead acid battery according to the first embodiment of the invention, some of the parts being omitted for clarity; and

Figure 2 shows a perspective view of the interior of a battery according to the second embodiment, only the arrangement of positive plates and attachments being shown.

As shown in Figure 1, the first embodiment of the invention comprises a lead acid battery 10 having a plurality of plates 11 and 12 alternately interleaved with separators 13 comprising sheets of microporous polyethylene and of non-woven glass fibre. The plates 11 and 12 and separators 13 are positioned in face-to-face arrangement and alternate plates are of positive and negative polarity, the positive plates being indicated by reference numeral 11 and the negative plates by reference numeral 12.

The plates and separators are housed in a rectangular container of plastics material (not shown) containing acid (not shown).

All the plates 11 and 12 are generally rectangular in shape and of generally the same size. The horizontal top edge 14 and bottom edge 15 of the plates (as shown) are much shorter than the vertical edges 16. The positive plates 11 are each provided on the top edge with a tag 17, having two parts 17a and 17b, adjacent a corner with a long edge. Directly below, each positive plate is provided on its lower edge with a tag 18 adjacent the corner with the same long edge. The plates are arranged so that the two tags are arranged in two rows, one row directly above the other. The negative plates are each formed with one tag 19 having two parts 19a and 19b on the top edge adjacent the corner with a long edge and the plates are arranged so that the tags 19 form a single row parallel to and spaced apart from the row of tags 17 on the upper edges of the positive plates.

The tags in each upper row lie in general side-by-side arrangement and

are each connected by respective connectors 20 and 21. Two sets of terminals 22 and 23 are integrally formed with the respective connectors 20 and 21, the connectors and terminals being formed by a casting operation. The terminals and connectors are of high conductivity copper, embedded in a lead sheath by a casting process.

Connected to the lower row of tags 18 on the positive plates 11 is a further connector 24 in the form of a strip of lead or lead-sheathed copper which is connected by means of a member in the form of a strip 25 of lead-sheathed copper to the connector at the top of the positive plates 11. The connector 24 and member 25 are joined by any suitable process to one another, to the lower row of tags and to the upper row of tags to make good electrical connections. The lead sheath prevents corrosion by the acid.

As can be seen in the drawing, the further connector 24 lies in a horizontal plane perpendicular to the plane of the plate and the member 25 lies in a vertical plane perpendicular to the plane of the plate except for a small section 26 where it is curved for connection to the further connector 24.

In the second embodiment of the invention, shown in Figure 2, the member of the first embodiment is replaced by a lead sheathed copper strip member 28 having the same general shape and dimensions but positioned between a negative plate 12 and a positive plate 11 (as shown) or at one end of the row of plates so as to lie parallel thereto, and separated from the plates by one or more separating sheets. The tags 18 on the lower edges of the positive plates 11 are replaced by tags 30 on a longer side, adjacent the corner with the lower edge. These tags 30 are connected to a lead sheathed copper or lead strip connector 27 which lies alongside the longer sides of the plates 11 and 12, rather than alongside the lower edge as in the first embodiment.

In this second embodiment any problems associated with plate growth and/or the deposition of debris, are alleviated.

In either embodiment the high conductivity strip member 25 or 28 of copper sheathed with lead may be connected to the lead sheath of the connector 20 or to the copper connector 20 itself. The latter construction has the greater conductivity.

CLAIMS:

1. A battery (10) comprising a housing containing a plurality of positive plates (11) connected in parallel and a plurality of negative plates (12) connected in parallel, the positive plates each being of substantially the same size and rectangular shape having two long edges (16a and 16b) and a first short edge (14) and a second short edge (15), characterised in that the housing also contains a member (25;28) having a first end and a second end, the first end being electrically connected to the first short edges (14) of the positive plates (11) adjacent to one of the two sets of long edges (16a) and the second end being electrically connected to the second short edges (15) of the positive plates (11)adjacent the same set of long edges (16a) or to the same set of long edges (16a) of the positive plates (11) immediately adjacent to the second short edges (15), the member (25;28) extending parallel to the said long edges (16a and 16b) for most its length and consisting of a material which has a greater conductivity than the material of the positive plates (11).

2 A battery (10) according to Claim 1 characterised in that the negative plates (12) are each substantially the same size and rectangular shape having two long edges (16) and a first short edge (14) and a second short edge (15), and a further member (25;28) is provided, the further member having a first end and a second end, the first end being electrically connected to the first short edges (14) of the negative plates (12) and the second end being electrically connected to the second short edges (15) of the negative plates (12) or to one of the long edges (16) of the negative plates (12) immediately adjacent to the second short edges (15), the further member (25;28) consisting of a material which has a greater conductivity than the material of the negative plates (12).

3. A battery (10) according to either Claim 1 or Claim 2 characterised in that the negative plates (12) and the positive plates (11) are all substantially the same size and rectangular shape.

4. A battery (10) according to any one of the preceding claims characterised in that the first short edges (14) of the positive plates are connected by a connector (20) which is electrically connected to a positive terminal (22) of the battery (10).

5. A battery (10) according to any one of the preceding claims characterised in that the second short edges (15) of the positive plates (12) are connected by a further connector (24).

6. A battery (10) according to Claim 5 characterised in that the further connector (24) is of the same general material as the positive plates (12).

7. A battery (10) according to Claim 5 characterised in that the second connector (24) is of the same general material as the member (25).

8. A battery (10) according to any one of the preceding claims which is a lead acid battery.

9. A battery (10) according to Claim 8 characterised in that the member (25;28) comprises copper covered in a lead sheath.

10. A battery (10) according to claim 9 characterised in that the connector (20) comprises copper covered in lead.

11. A battery (10) according to claim 9 or 10 characterised that the positive terminal (22) comprises copper covered in lead.

12. A battery (10) according to Claim 8 characterised in that the member (25;28) comprises a copper alloy such as brass, covered in a lead sheath.

13. A battery (10) according to Claim 8 characterised in that the member (25;28) comprises aluminium covered in a lead sheath.

14. A battery (10) according to Claim 8 characterised in that the member (25;28) comprises an aluminium alloy covered in a lead sheath.

15. A battery (10) according to any one of Claims 9 to 12 characterised in that the sheath is covered in an acid resistant material such as an epoxy resin.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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H01M 2/22, 2/28, 2/26, 10/12, 10/04

A1

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(30) Priority Data:
9802362.5 4 February 1998 (04.02.98) GB

(71) Applicant *(for all designated States except US)*: CHLORIDE INDUSTRIAL BATTERIES LIMITED [GB/GB]; BTR House, Carlisle Place, London SW1P 1BX (GB).

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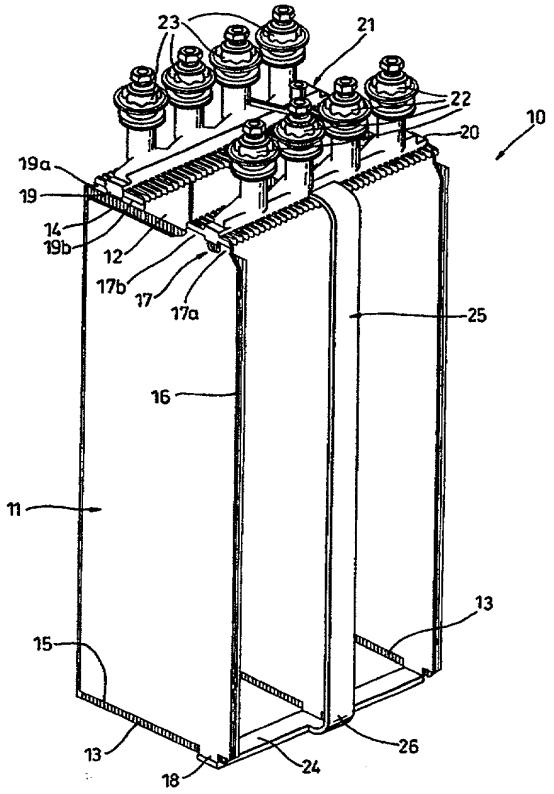
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DE (Utility model), DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: BATTERY WITH TOP AND BOTTOM CONNECTING STRAPS AND ADDITIONAL VERTICAL CONNECTING BARS

(57) Abstract

A battery (10) having positive and negative plates (11, 12) contained in a housing. The upper edges of the positive plates are connected to the lower edges by means of a member (25; 28) also contained in the housing. The member (25; 28) comprises a material having a greater conductivity than that of the material of the plates.



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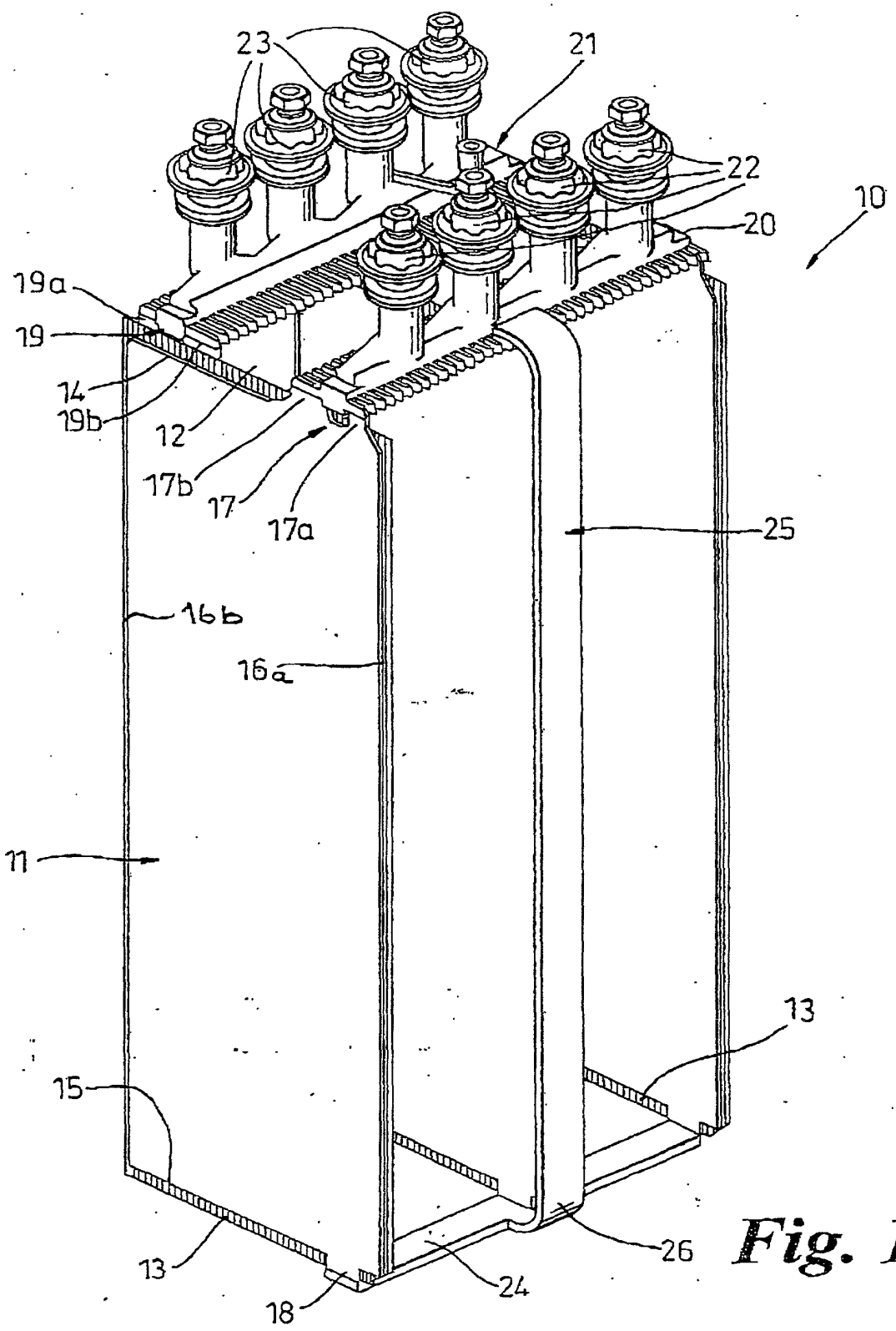

Fig. 1

AMENDED SHEET

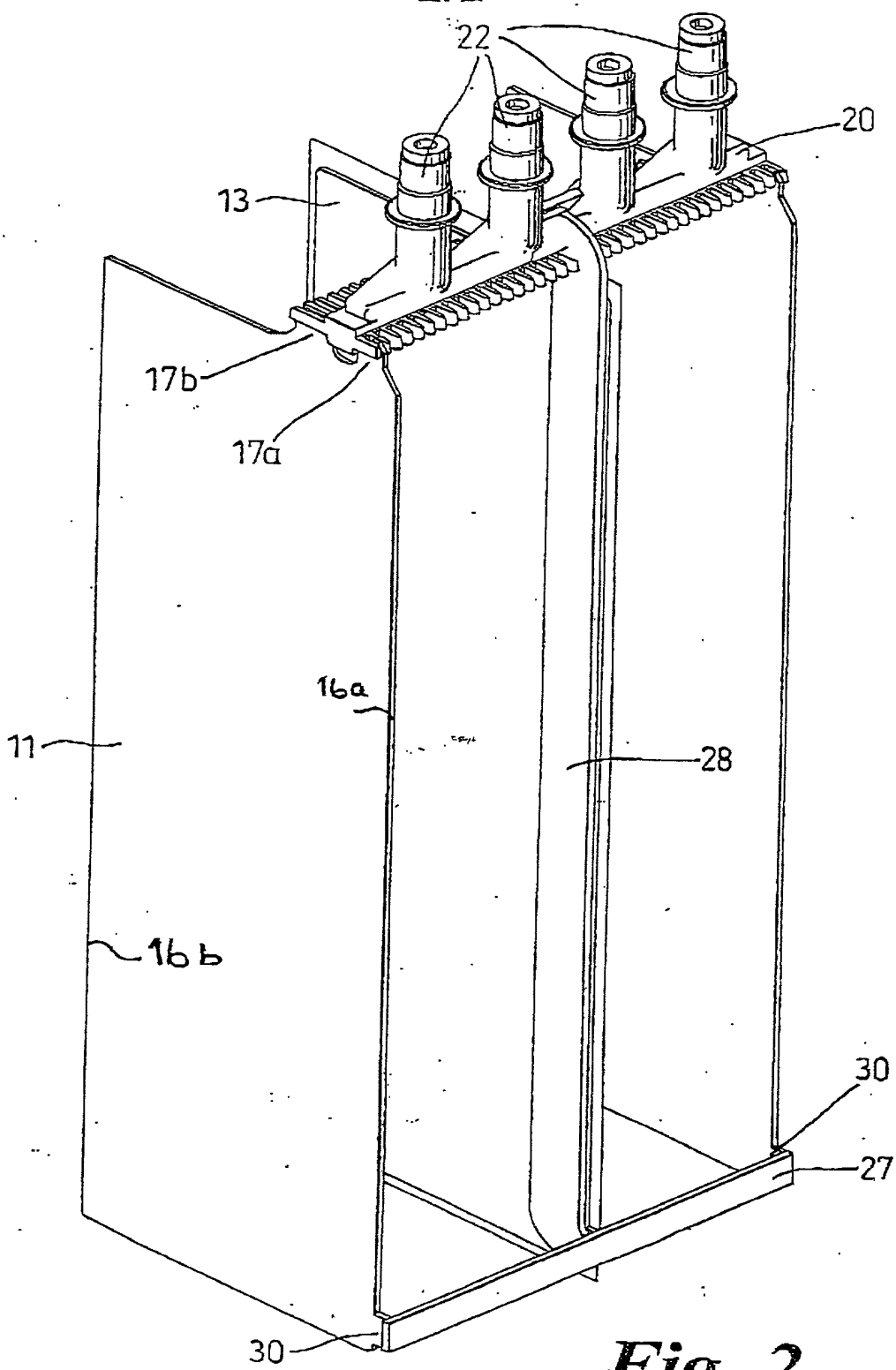

Fig. 2

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

BATTERY

the specification of which: *(check one)*

REGULAR OR DESIGN APPLICATION

[ ] is attached hereto.

[X] was filed on August 3, 2000 as application Serial No. _____ and was amended on August 3, 2000 (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

[X] was described and claimed in International application No. PCT/GB99/00194 filed on 20 January 1999 and as amended on 04 February 2000 (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

PRIORITY CLAIM

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

Country	Application Number	Date of Filing (day, month, year)	Priority Claimed
United Kingdom	**9802362.5**	**04 February1998**	**Yes**

(Complete this part only if this is a continuing application.)

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (Filing Date) (Status--patented, pending, abandoned)

POWER OF ATTORNEY

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from **Invensys plc** as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

As a named inventor, I hereby appoint the registered patent attorneys represented by Customer No. **000466** to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, including: **Robert J. PATCH, Reg. No. 17,355, Andrew J. PATCH, Reg. No. 32,925, Robert F. HARGEST, Reg. No. 25,590, Benoît CASTEL, Reg. No. 35,041, Eric JENSEN, Reg. No. 37,855, Thomas W. PERKINS, Reg. No. 33,027, and Roland E. LONG, Jr., Reg. No. 41,949,**

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: **Kenneth Michael PARTINGTON**
(given name, family name)

Inventor's signature Kenneth Michael Partington. Date 8/11/00

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Full name of second joint inventor, if any: **David Colin ~~SMITH~~ BROWN** ADB
(given name, family name)

Inventor's signature A.D.Brown Date 9/15/00 ADB.

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